

18. In one sample of 8 observations the sum of the squares of deviations of the sample values from the sample mean was 84.4 and in the other sample of 10 observations it was 102.6. Test whether this difference is significant at 5 per cent level, given that the 5 per cent point of F for $n_1 = 7$ and $n_2 = 9$ degrees of freedom is 3.29.

19. Find the rank correlation coefficient for the following data.

X 68 64 75 50 64 80 75 40 55 64

Y 62 58 68 45 81 60 68 48 50 70

20. Obtain the equations of the lines of regression for the data

X 65 66 67 67 68 69 70 72

Y 67 68 65 68 72 72 69 71

APRIL/MAY 2025

**23UEDA22A — MATHEMATICAL
STATISTICS – II**

Time : Three hours

Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. What is standard error? Mention the standard error of sample mean.
2. Define the level of signification.
3. State any two applications of t-distribution.
4. Define t-test.
5. Define F-statistic.
6. Write mode of F-distribution.
7. Define rank correlation.
8. Write formula for Correlation coefficient between two variables.



9. Write the regression equation of X on Y .
10. Write the angle between the two regression lines.

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL the questions.

11. (a) A normal population has a mean of 0.1 and standard deviation of 2.1. Find the probability that mean of a sample of size 900 will be negative.

Or

- (b) Write the procedure for testing of hypothesis for large samples.
12. (a) Derive student's t -distribution.

Or

- (b) Derive limiting form of t -distribution.
13. (a) Prove that if $n_1 = n_2$ the median of F -distribution is at $F=1$ and that the quartiles Q_1 and Q_3 satisfy the condition $Q_1 Q_3 = 1$.

Or

- (b) Show how probability points of $F(n_2, n_1)$ can be obtained from those of $F(n_1, n_2)$.

14. (a) If $Z = aX + bY$ and r is the correlation coefficient between X and Y , show that $\sigma_z^2 = a^2 \sigma_X^2 + b^2 \sigma_Y^2 + 2abr \sigma_X \sigma_Y$.

Or

- (b) Derive Spearman's Rank Correlation Coefficient.

- (a) Prove that Regression coefficients are independent of the change of origin but not of scale

Or

- (b) Derive Standard Error of Estimate or Residual Variance.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. In two large populations there are 30 and 25 percent respectively of fairhaired people. Is this difference likely to be hidden in samples of 1,200 and 900 respectively from the two populations?
17. The height of six randomly chosen sailors are (in inches): 63, 65, 68, 69, 71, 72. Those of 10 randomly chosen soldiers are 61, 62, 65, 66, 69, 70, 71, 72 and 73. Discuss the light that these data throw on the suggestion that sailors are on the average taller than soldiers.